APR 2026/RE/SN-2

TECHFLASH

Fraunhofer

Sustainable Battery Systems

The energy transition is essential for a secure, sustainable, and economically viable future, requiring more efficient, cost-effective, and environmentally friendly energy technologies. Fraunhofer IST focuses on developing materials, processes, and factory systems for recyclable energy storage solutions, including hydrogen technologies.

Its core competencies include economic and environmental assessment of production systems, process optimization through multi-scale simulation, and process monitoring. A key objective is the holistic and sustainable design of energy storage systems across the entire life cycle - from raw material extraction to production, use, and recycling. To ensure continuous improvement across the product life cycle, sustainable solutions require professional life cycle engineering (LCE). We support customers throughout the entire life cycle - from material production to recycling - using methods such as life cycle assessment (LCA) and life cycle costing (LCC) to evaluate technical, economic, and environmental performance.

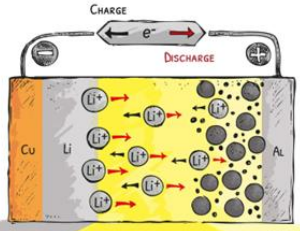
Life Cycle Engineering:

Ecological assessment:
- Method and software development
- Production systems for batteries
- Recycling of batteries

Economic evaluation:
- Method development
- Production systems for batteries

Analysis:
- Investigation of particle, suspension, and layer properties (e.g. morphology, crystallinity, particle size, chemical composition, viscosity, adhesive strength, and electrical conductivity)
- Cell performance and key indicators (e.g. ionic conductivity, cycling procedures and safety tests)

Recycling:
- Recycling of production wastes and end-of-life batteries
- Development and optimization of mechanical, thermal, and chemical processes and comprehensive process routes



Simulation:
- Multiscale simulation
- Electrochemical, thermal ,and mechanical behavior using FEM
- Particle network modelling using DEM (e.g. charge transport)

Anode:
- Development and production of metal anodes (e.g. lithium and silicon) for all solid-state batteries
- Evaluation and production of metal powder (e.g. lithium) as anode material

Solid electrolyte:
- Synthesis and processing of sulfide solid electrolytes on a kilogram scale
- Process upscaling and optimization for the production of separators

Cathode:
- (Re-)Synthesis of cathode active materials (e.g. NMC622, NMC811, NCA) on a kilogram scale
- Process upscaling and optimization for the production of composite cathodes

Fully automated synthesis plant for the production of cathode active materials on a kilogram scale

Roll-to-roll coating system for initial feasibility studies (larger pilot-scale systems are available as well)

Hot press in glove box for feasibility studies on solid-state batteries (larger systems are available as well)

In addition, integrated computational life cycle engineering enables highly automated, computer-aided evaluation of design options, supporting efficient decision-making in product development and factory planning (e.g., gigafactories).

> Click Here < to receive more info on this TechFlash.

Kindly get in touch with us if you are interested in this technology or require further information.
Thanks and Regards,

Ms. Anandi Iyer
Director, Fraunhofer Office India

Mr. Sanmati Naik
Sr. Manager - Energy (RE), Fraunhofer Office India
405-406, 30 MG Road, Bengaluru – 1
e-Mail: sanmati.naik@fraunhofer.in
Tel: +91 80 40965008/09, Mob: +91 7996425980
www.fraunhofer.in www.fraunhofer.de